

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A substrate processing apparatus comprising:

(a) a substrate holding part to hold a substrate in its substantially horizontal position;

(b) a rotary part to rotate a substrate held by said substrate holding part in a substantially horizontal plane;

(c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to a substrate held by said substrate holding part;

(d) a plurality of guide parts of substantially annulus ring shape that receives a processing liquid flying spattering from a substrate in rotation, on the side of a substrate held by said substrate holding part ;

(e) a plurality of processing liquid passages of substantially cylindrical annulus ring shape that are provided to said plurality of guide parts in one-to-one correspondence and feed downwardly a processing liquid introduced from their corresponding guide parts; and

(f) a position adjusting part to adjust the physical relationship between said substrate held by said substrate holding part and each of said guide parts, such that a processing liquid flying spattering from a substrate in rotation is received by a guide part corresponding to the recovery type of the processing liquid,

said plurality of guide parts comprising:

(d-1) a first processing liquid guide part to receive a first processing liquid flying spattering from a substrate in rotation; and

(d-2) a plurality of second processing liquid guide parts that are stacked in multistage on said first processing liquid guide part and receive a second processing liquid flying spattering from a substrate in rotation, and wherein

an outer guard forming at least the lowermost second processing liquid guide part in said plurality of second processing liquid guide parts includes:

a first cylindrical part arranged coaxially with said substrate holding part;

an inclined part extending obliquely downwardly toward said substrate holding part from the lower end of said first cylindrical part; and

a second cylindrical part extending vertically downwardly from the lower end of said inclined part, and

a maximum an internal diameter of said first cylindrical part forming at least the lowermost second processing liquid guide part in said plurality of second processing liquid guide parts is greater than an internal diameter of said second cylindrical part forming a processing liquid passage corresponding to said lowermost second processing liquid guide part.

2. (Original) The substrate processing apparatus according to claim 1 wherein said first processing liquid is pure water and said second processing liquid is a chemical solution.

3. (Currently Amended) The substrate processing apparatus according to claim 2 wherein

disposed are a plurality of first recovery tanks of doughnut-like shape corresponding to said second processing liquid guide parts so as to recover, through said processing liquid passages, a second processing liquid flying spattering from said substrate by rotation, said apparatus further comprising:

(g) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:

(g-1) a storage tank having an inside space a doughnut-like shape that is approximately the same as internal space shape of the corresponding said first recovery tank; and

(g-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank.

4. (Original) The substrate processing apparatus according to claim 3 wherein

disposed is a second recovery tank corresponding to said first processing liquid guide part so as to recover, through a processing liquid passage, said first processing liquid flying spattering from said substrate by rotation,

said apparatus further comprising:

(h) a discharge pipe through which said first processing liquid recovered in said second recovery tank is discharged and discarded to the exterior.

5. (Original) The substrate processing apparatus according to claim 4 wherein said storage tanks contained in each of said plurality of storage parts are stacked one upon another substantially vertically.

6. (Currently Amended) The substrate processing apparatus according to claim 5 1, further comprising:

(i) a ~~first processing liquid discharge part~~ discharge nozzle that has a discharge port disposed in said first processing liquid guide part and discharges said first processing liquid from said discharge port to said substrate holding part.

7. (Original) The substrate processing apparatus according to claim 6 wherein said first processing liquid guide part is located at a position lower than the lowermost said second processing liquid guide part.

8. (Currently Amended) The substrate processing apparatus according to claim 7 1, wherein

said first processing liquid guide part includes:

a liquid passage that is formed in said first processing liquid guide part and connected in communication to said processing liquid supply part; and

a ~~discharge part~~ nozzle that is disposed on the inner peripheral surface side of said first processing liquid guide part and discharges said first processing liquid supplied from said

processing liquid supply part to said substrate holding part via said liquid passage connected in communication.

9. (Original) The substrate processing apparatus according to claim 8, further comprising:

(j) a pipe that is disposed below said liquid passage and moves relatively with respect to said liquid passage; and

(k) a relay pipe to provide communication between said liquid passage and said pipe, said relay pipe being flexibly disposed.

10. (Currently Amended) A substrate processing apparatus comprising:

(a) a substrate holding part to hold a substrate in its substantially horizontal position;

(b) a rotary part to rotate said substrate held by said substrate holding part in a substantially horizontal plane;

(c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to said substrate held by said substrate holding part;

(d) a plurality of guide parts of substantially annulus ring shape that receives a processing liquid flying spattering from a substrate in rotation on the side of said substrate held by said substrate holding part ;

(e) a plurality of processing liquid passages of substantially cylindrical annulus ring shape that are provided to said plurality of guide parts in one-to-one correspondence and feed downwardly processing liquids introduced from their corresponding guide parts; and

(f) a position adjusting part to adjust the physical relationship between said substrate held by said substrate holding part and said guide parts, such that a processing liquid flying spattering from a substrate in rotation is received by a guide part corresponding to the recovery type of the processing liquid,

said plurality of guide parts comprising:

(d-1) a ~~first processing liquid pure water~~ guide part to receive a ~~first processing liquid pure water~~ flying spattering from a substrate in rotation; and

(d-2) a plurality of ~~second processing liquid~~ chemical solution guide parts that are stacked in multistage on said first processing liquid guide part and receive a ~~second processing liquid~~ chemical solution flying spattering from a substrate in rotation, and wherein

an outer guard forming at least the lowermost chemical solution guide part in said plurality of chemical solution guide parts includes:

a first cylindrical part arranged coaxially with said substrate holding part;

an inclined part extending obliquely downwardly toward said substrate holding part from the lower end of said first cylindrical part; and

a second cylindrical part extending vertically downwardly from the lower end of said inclined part, and

said lowermost ~~second processing liquid~~ chemical solution guide part is disposed such that said inclined part forming the lowermost chemical solution guide part in ~~said plurality of second processing liquid guide parts covers~~ is positioned above ~~of an outer cylindrical part forming~~ a processing liquid passage that corresponds to the ~~second processing liquid~~ chemical solution guide part immediately overlying the ~~second processing liquid~~ guide part of said the lowermost ~~second processing liquid~~ chemical solution guide part.

11. (Canceled)

12. (Currently Amended) The substrate processing apparatus according to claim ~~10~~ 10, wherein

disposed are a plurality of first recovery tanks of doughnut-like shape corresponding to said ~~second processing liquid~~ chemical solution guide parts so as to recover, through said processing liquid passages, a ~~second processing liquid~~ chemical solution flying spattering from said substrate by rotation,

said apparatus further comprising:

(g) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:

(g-1) a storage tank having ~~an inside space~~ a doughnut-like shape that is approximately the same as ~~internal space~~ shape of the corresponding said first recovery tank; and

(g-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank.

13. (Original) The substrate processing apparatus according to claim 12 wherein disposed is a second recovery tank corresponding to said first processing liquid guide part so as to recover, through said processing liquid passages, said first processing liquid flying spattering from said substrate by rotation,

said apparatus further comprising:

(h) a discharge pipe through which said first processing liquid recovered in said second recovery tank is discharged and discarded to the exterior.

14. (Original) The substrate processing apparatus according to claim 13 wherein said storage tanks contained in each of said plurality of storage parts are stacked one upon another substantially vertically.

15. (Currently Amended) The substrate processing apparatus according to claim ~~14~~ 10, further comprising:

(i) a ~~first processing liquid~~ pure water discharge part nozzle that has a discharge port disposed in said ~~first process liquid~~ pure water guide part and discharges said ~~first processing liquid~~ pure water from said discharge port to said substrate holding part.

16. (Original) The substrate processing apparatus according to claim 15 wherein said first processing liquid guide part is located at a position lower than the lowermost said second processing liquid guide part.

17. (Currently Amended) The substrate processing apparatus according to claim ~~16~~ 10, wherein

said first processing liquid pure water guide part includes:
a liquid passage that is formed in said first processing liquid pure water guide part and connected in communication to said processing liquid supply part; and
a discharge part nozzle that is disposed on the inner peripheral surface side of said first processing liquid pure water guide part and discharges said first processing liquid pure water supplied from said processing liquid supply part to said substrate holding part via said liquid passage connected in communication.

18. (Original) The substrate processing apparatus according to claim 17, further comprising:

- (j) a pipe that is disposed below said liquid passage and moves relatively with respect to said liquid passage; and
- (k) a relay pipe to provide communication between said liquid passage and said pipe, said relay pipe being flexibly disposed.

19. (Currently Amended) A substrate processing apparatus to perform a predetermined substrate processing by supplying a processing liquid to a substrate while rotating the substrate, comprising:

- (a) a substrate holding part to hold a substrate in its substantially horizontal position;
- (b) a rotary part to rotate said substrate held by said substrate holding part in a substantially horizontal plane;
- (c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to a substrate held by said substrate holding part;
- (d) a four-stage splash guard that is disposed so as to annularly circumscribe a substrate held by said substrate holding part and is composed of a first guard, second guard, third guard and fourth guard arranged in inner-to-outer order; and
- (e) a lifting part to lift and lower said splash guard substantially vertically, and wherein in a vertical direction, an inside of said first guard, a space between said first and second guards, a space between said second and third guard, and a space between said third and fourth

guards serve as a first guide part, second guide part, third guide part and fourth guide part, respectively,

in a horizontal direction, the inside of said first guard, the space between said first and second guards, the space between said second and third guard, and the space between said third and fourth guards serve as a first processing liquid passage, second processing liquid passage, third processing liquid passage and fourth processing liquid passage, respectively,

said second guard includes:

a first cylindrical part arranged coaxially with said substrate holding part;

a projected part projecting obliquely upwardly toward said substrate holding part from the upper end of said first cylindrical part;

an inclined part extending obliquely downwardly toward said substrate holding part from the lower end of said first cylindrical part; and

a second cylindrical part extending vertically downwardly from the lower end of said inclined part,

 said second guard is curved such that the maximum internal diameter of said first cylindrical part forming said second guide part is greater than the internal diameter of said second cylindrical part forming said second processing liquid passage,

 said first guard receives a first processing liquid flying spattering from a substrate in rotation, and

 said second, third and fourth guards receive a second processing liquid flying spattering from a substrate in rotation.

20. (Original) The substrate processing apparatus according to claim 19 wherein
 said first processing liquid is pure water and said second processing liquid is a chemical
solution.

21. (Currently Amended) The substrate processing apparatus according to claim
20 wherein

disposed are a plurality of first recovery tanks of doughnut-like shape that correspond to said second, third and fourth processing liquid passages and recover a second processing liquid flying spattering from said substrate by rotation,

said apparatus further comprising:

(f) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:

(f-1) a storage tank having ~~an inside space~~ a doughnut-like shape that is approximately the same as ~~internal space~~ shape of the corresponding said first recovery tank; and

(f-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank.

22. (Original) The substrate processing apparatus according to claim 21 wherein disposed is a second recovery tank that corresponds to said first guard and recovers said first processing liquid flying spattering from said substrate by rotation,

said apparatus further comprising:

(g) a discharge pipe through which said first processing liquid recovered in said second recovery tank is discharged and discarded to the exterior.

23. (Original) The substrate processing apparatus according to claim 22 wherein said storage tanks contained in each of said plurality of storage parts are stacked one upon another substantially vertically.

24. (Currently Amended) The substrate processing apparatus according to claim 23 19, further comprising:

(h) a first processing liquid discharge part nozzle that has a discharge port disposed in said first guard and discharges said first processing liquid from said discharge port to said substrate holding part.

25. (Original) The substrate processing apparatus according to claim 24 wherein said first guard is located at a position lower than the lowermost one of said second, third and fourth guards.

26. (Currently Amended) The substrate processing apparatus according to claim 25 19, wherein

said first guard includes:

a liquid passage that is formed in said first guard and connected in communication to said processing liquid supply part; and

a discharge part nozzle that is disposed on the inner peripheral surface side of said first guard and discharges said first processing liquid supplied from said processing liquid supply part to said substrate holding part via said liquid passage connected in communication.

27. (Original) The substrate processing apparatus according to claim 26, further comprising:

(i) a pipe that is disposed below said liquid passage and moves relatively with respect to said liquid passage; and

(j) a relay pipe to provide communication between said liquid passage and said pipe, said relay pipe being flexibly disposed.

28. (Currently Amended) A substrate processing apparatus to perform a predetermined substrate processing by supplying a processing liquid to a substrate while rotating said substrate, comprising:

(a) a substrate holding part to hold a substrate in its substantially horizontal position;

(b) a rotary part to rotate a substrate held by said substrate holding part in a substantially horizontal plane;

(c) a processing liquid supply part to selectively supply a plurality of types of processing liquids to a substrate held by said substrate holding part;

(d) a four-stage splash guard that is disposed so as to annularly circumscribe a substrate

held by said substrate holding part and is composed of a first guard, second guard, third guard and fourth guard arranged in inner-to-outer order; and

(e) a lifting part to lift and lower said splash guard substantially vertically, and wherein in a vertical direction, an inside of said first guard, a space between said first and second guards, a space between said second and third guard, and a space between said third and fourth guards serve as a first guide part, second guide part, third guide part and fourth guide part, respectively,

in a horizontal direction, the inside of said first guard, the space between said first and second guards, the space between said second and third guard, and the space between said third and fourth guards serve as a first processing liquid passage, second processing liquid passage, third processing liquid passage and fourth processing liquid passage, respectively,

said second guard includes:

a first cylindrical part arranged coaxially with said substrate holding part;

a first projected part projecting obliquely upwardly toward said substrate holding part from the upper end of said first cylindrical part;

an inclined part extending obliquely downwardly toward said substrate holding part from the lower end of said first cylindrical part; and

a second cylindrical part extending vertically downwardly from the lower end of said inclined part,

said third guard includes:

a third cylindrical part arranged coaxially with said substrate holding part;

a second projected part projecting obliquely upwardly toward said substrate holding part from the upper end of said third cylindrical part; and

a fourth cylindrical part that is provided fixedly so as to branch from the internal wall surface of said third cylindrical part and is disposed closer to said substrate holding part than said third cylindrical part,

said second guard is curved such that the maximum internal diameter part of said inclined part forming said second guide part covers is positioned above said fourth cylindrical part forming said third processing liquid passage,

said first guard receives a first processing liquid flying spattering from a substrate in rotation, and

said second, third and fourth guards receive a second processing liquid flying spattering from a substrate in rotation.

29. (Original) The substrate processing apparatus according to claim 28 wherein said first processing liquid is pure water and said second processing liquid is a chemical solution.

30. (Currently Amended) The substrate processing apparatus according to claim 29 wherein

disposed are a plurality of first recovery tanks of doughnut-like shape that correspond to said second, third and fourth processing liquid passages and recover a second processing liquid flying spattering from said substrate by rotation,

said apparatus further comprising:

(f) a plurality of storage parts that are located separately below said plurality of first recovery tanks so as to correspond to said plurality of first recovery tanks, respectively, each storage part including:

(f-1) a storage tank having ~~an inside space~~ a doughnut-like shape that is approximately the same as ~~internal space~~ shape of the corresponding said first recovery tank; and

(f-2) a plurality of pipes to connect in communication at a plurality of locations between the bottom of said corresponding said first recovery tank and the inside of said storage tank.

31. (Original) The substrate processing apparatus according to claim 30 wherein disposed is a second recovery tank that corresponds to said first guard and recovers said first processing liquid flying spattering from said substrate by rotation,

said apparatus further comprising:

(g) a discharge pipe through which said first processing liquid recovered in said second recovery tank is discharged and discarded to the exterior.

32. (Original) The substrate processing apparatus according to claim 31 wherein said storage tanks contained in each of said plurality of storage parts are stacked one upon another substantially vertically.

33. (Currently Amended) The substrate processing apparatus according to claim 32 28, further comprising:

(h) a first processing liquid discharge part nozzle that has a discharge port disposed in said first guard and discharges said first processing liquid from said discharge port to said substrate holding part.

34. (Original) The substrate processing apparatus according to claim 33 wherein said first guard is located at a position lower than the lowermost one of said second, third and fourth guards.

35. (Currently Amended) The substrate processing apparatus according to claim 34 28, wherein

said first guard includes:

a liquid passage that is formed in said first guard and connected in communication to said processing liquid supply part; and

a discharge part nozzle that is disposed on the inner peripheral surface side of said first guard and discharges said first processing liquid supplied from said processing liquid supply part to said substrate holding part via said liquid passage connected in communication.

36. (Original) The substrate processing apparatus according to claim 35, further comprising:

(i) a pipe that is disposed below said liquid passage and moves relatively with respect to said liquid passage; and

(j) a relay pipe to provide communication between said liquid passage and said pipe, said relay pipe being flexibly disposed.